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Citrus Fruits, Florida — Statistics

Review Of Florida Citrus Season

Being A Discussion Of The Outstanding Causes For The Unsatisfactory Season, From The Standpoint Of Financial Returns To The Grower, By Agricultural Economist, Florida Agricultural Experiment Station . . .

C. V. Noble

With the opening of a new citrus shipping season it is well to review the results of last season's citrus operations. The accompanying article by Dr. Noble is a comprehensive resume which will be of interest and value to Florida growers and shippers.—Editor.

The 1937-38 Florida citrus season is now a matter of history. It will be recorded as a very unsatisfactory season to growers from the standpoint of financial returns. The two outstanding causes for the low returns per unit of product were the decreased purchasing power of consumers, due to the so-called business recession which started just before the opening of the Florida citrus season, and the all-time record crop of oranges in Florida and California together with a grapefruit crop in all producing areas which was exceeded only by the record crop of 1936-37. When these causes occur singly they are difficult to overcome, but the combination creates a serious situation.

The decreasing purchasing power of consumers since August, 1937, can well be summarized from a May 16 report from the Federal Bureau of Agricultural Economics. If the average income of industrial workers (which includes factory workers, railroad and mining employees) for the five year period ending with 1929 be taken as 100, the income for this same group of workers in August, 1937 was 95 and since that date has rapidly decreased until in March, 1938 (the latest figure available) it stood at 68. In other words each ninety-five cents of purchasing power for this large group of workers in August, 1937, had been reduced to sixty-eight cents in March, 1938, or about 30 per cent. It, therefore, seems reasonable to conclude that their demand for citrus fruit would necessarily decrease unless the unit price of same was reduced.

The second outstanding cause mentioned was the record supply of citrus fruits. Each succeeding monthly estimate from the citrus areas has shown an increase over the previous estimate. The last report from our State Agricultural Statistician, dated May 11, 1938, released the early May total production estimate of the Federal Crop Reporting Board for all citrus areas for the 1937-38 season (Table 1). The present estimate of 99,564,000 boxes of oranges, grapefruit and tangerines in all areas is an all-time record and represents an increase of 16 per cent over the crop of 1936-37. The orange estimate shows an increase of 31 per cent over the previous season, and the grapefruit estimate is but 5 per cent under the record crop of 1936-37.

Carlot shipments of oranges, grapefruit and tangerines by rail, boat and motor truck from all areas through May 18 this season represent an increase of 7.9 per cent over shipments on the same date a year earlier (Table 2). That is, with an estimated production increase of 16 per cent, actual shipments to date this season show a considerable lag. Most of this lag occurs in the movement of grapefruit. Since cannery fruit is not represented in this movement, it may materialize that a much larger proportion of the Texas crop is being canned this season. The latest available report on cannery fruit in Florida through May 14, 1938, indicates that up to that date 5,293,911 field boxes of grapefruit had moved to canneries, or 21 per cent less than the total amount canned in 1936-37. On the other

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Citrus Growers, Inc. Florida

Citrus Growers Organize . . .

Florida Citrus Growers, Inc., Said To Hold Great Potentialities For Improving Condition and Improving The Situation in Citrus Industry Generally, According To Florida Agricultural Extension Service Citriculturist,

E. F. DeBusk

A few weeks ago something moved upon the face of the earth and citrus growers of Florida began to "wake up" from their slumbers, rub their eyes, and ask themselves and eacn other the question: "where are we?" when the self-searching light was turned on they began to see that the only thing radically wrong with the citrus industry of Florida is the attitude and interest of the growers themselves. They began to move closer together into groups, look each other over; and seen visions of possibilities through collective effort began to appear across the horizon of a new day for the Florida citrus industry.

In rapid succession counties have been organized. When the number reached 11, duly elected representatives from the various counties met and organized Florida Citrus Growers, Inc., with its principal office and place of business in Orlando. Fifteen counties have now been organized and affiliated as units of the state organization. Three additional counties are in process of being organized. The total reported membership is about 5,000 growers and the number is rapidly increasing.

The various county organizations are based on a keenly felt need of major adjustments in the industry. It is recognized that the industry has been abused, and that by the men of the industry itself. It has withstood much ill treatment. In its operation practically every fundamental business principle has been violated. Yet, today the business is sound. No branch of agriculture in this country offers greater opportunities to the men engaged in it. There is nothing wrong with the industry but maladjustment and mismanagement.

In the first place the average grower is living in confusion. He can't understand why certain factors in the industry operate as they do. He has seen evidence of such flagrant selfishness and destructive practices in the industry that he has lost confidence in many of those prominently active as leaders.

This lost confidence can be restored and maintained by working together under wise, unselfish leadership. Growers need more faith in themselves. This will come from working together on a common cause. It is recognized that a higher degree of confidence and good-will must be established and maintained with relation to growers, shippers, dealers and consumers.

Among the expressed purposes of this grower organization is "to give the growers of Florida identity in the citrus industry; to bring about a better understanding of all phases of the citrus industry and to create confidence and good-will between those responsible for the various activities throughout the industry, to the end that better cultural methods may be employed to improve the quality of citrus fruits and that marketing methods may be improved, markets stabalized and new markets developed."

It is determined that growers shall have representation in legislative matters in order to obtain the necessary legal instruments of service and protection.

This grower organization proposes to "cooperate, collectively, with Federal and State agencies in the improvement of the citrus industry and to assist such agencies in carrying out the mandates of law and regulation affecting the citrus industry."

To proceed intelligently and effectively in making desired adjustments the need of a better understanding of all phases of the industry is recognized. To this end the organization propses "to foster, encourage and promote research beneficial to the growers, and to cooperate with all existing research agencies."

This grower organization is founded on definite and keenly felt needs and is inspired to action by worthy purposes and objectives. There is evidence that the spirit of cooperation has been a guiding influence in developing many of the expressed purposes of its program. This is indeed encouraging. I believe we have reached the stage in the history of our citrus industry when a majority realize that we will succeed only as we work together. The economic welfare of the industry demands that we bring to an end this era of mismanagement and destructive competition.

Confusion and views emphasizing a distrust for each other can be dispelled by active participation in the cooperative movement and its philosophy. All of the great demands laid on us today for building an adequate industry program have cooperation at their center.

The expressed purposes and objectives of this grower organization merit the support of, not only every grower in the state, but the encouragement and support of every business man and business institution. All are affected. Those who fear for the safety of our citrus industry may well turn to this movement, lend a helping hand and take hope.

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Controlling Root-knot In Seed Beds

An Outline of The Destructive Character of Worms Causing Root-Knot, Causes and Remedies For Control As Outlined by Prominent Florida Experiment Station Entomologist.

J. R. Watson

Our truckers are in many instances getting their seed beds ready for the coming season. One of the worst pests of young plants in seed beds are the nematode worms which cause root-knot. It is particularly important that the seed bed be free of root-knot, much more important than that the field be free of these things. This, for at least three reasons. First, at this time of the year root-knot worms are particularly active. By the 1st of November, at least in the more northern parts of Florida, the falling temperatures will slow up their activities. In the second place, they will do much more damage to the young plants than they will to the older ones, and in the thrid place an infested seed bed will carry the worms to an entire field, which may have been free of root-knot before this introduction.

It is a common practice to avoid root-knot by putting the seed bed on newly cleared land. Such land can usually be depended upon to be free of root-knot, unless refuse from infested fields has been dumped on it, or it is so situated as to allow water from infested fields to run over it. But, for many truckers, newly cleared land is not available. Furthermore, many seed beds are more or less permanent, often equipped with an irrigation system which is not readily moved. In such seed beds it is necessary for the growers to exterminate the root-knot by some means.

The cheapest way to free a piece of land from root-knot is to grow on it during the summer time some plants that will not harbor root-knot, to the exclusion of all other plants. The bunch velvet bean is such a plant, but the Crotalaria spectabilis is better. Its upright habit of growth and early maturity makes it more desirable. Velvet beans do not begin to shade the ground well until August, by which time many truckers wish to prepare their seed beds. Whichever plant is used, the seed bed must be kept absolutely free of all weeds and grasses, as a great many of these harbor root-knot. Most grasses and weeds are rather resistant to rot-knot and will flourish in spite of it, but if they harbor even a little of it this will be sufficient to carry the root-knot through the summer and make the land unfit for seed beds in the fall. These highly resistant plants are really more dangerous from the standpoint of root-knot infestation than those which are heavily infested because the small number and the size of the knots on their roots often are overlooked by the trucker who thinks that they are harmless. Most weeds and grasses are of this nature.

It is,, of course, too late to use this starvation method for preparing seed beds for the coming season. It should have been undertaken by June or, better, May. At this time of the year the growers will have to depend upon chemical means to get rid of root-knot. Of these methods, the most thorough we have ever tried is a double treatment of sodium cyanide and ammonium sulphate. The land is first plowed or disked, the sodium cyanide is then dissolved in water and ths solution poured evenly over the soil. Irrigation water is then turned on until this solution is washed down to the depth of eight or ten inches, or to the water table. Immediately afterwards, certainly the same day, a solution of ammonium sulfate is applied to the soil, in proportions 50 per cent greater than the sodium cyanide. A little more irrigation water is then turned on, enough to wash the ammonium sulfate down to the same depth as the cyanide solution. After this the seed bed should be covered with some material which will retain the gas—old newspapers will do nicely.

The killing agent in this case is hydro-cyanic acid gas, formed in the soil where the ammonium sulfate reacts upon the sodium cyanide. The amounts to use will depend upon the character of the soil. The heavier the soil the greater the quantity necessary. In light sandy loams, characteristic of the more common seed beds, about 1200 pounds of sodium cyanide and 1800 pounds of ammonium sulfate per acre should be used to insure thorough eradication. On very light soil, smaller amounts will suffice; on heavy, impervious soils more will be necessary. This method is expensive, costing over $100 per acre for the materials alone. This expense eliminates this method for large acreage, but seed beds are small and the expense is not great for such valuable crops. Furthermore, this treatment leaves the soil immensely rich in nitrogen. No other application of nitrogenous fertilizer is necessary nor desirable on these seed beds.

Seed beds can be planted within a week or ten days after treatment. One using this method must remember that the sodium cyanide is very poisonous, and this is equally true of the gas given off, hydro-cyanic acid gas. However, very little gas will be given off until after the ammonium sulfate is applied. One must be careful that the sodium cyanide solution does not touch his bare skin, particularly if there are sores on his hands. Of course, the hands

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50 Years Of Agricultural Research

Research Along Horticultural Lines Has Been An Important Part Of The Work Of The Agricultural Experiment Station For The Past 50 years, As Explained In This Article By Experiment Station Horticulturist . . .

G. H. Blackmon

Horticultural research has been an important part of the work carried out by the University of Florida Agricultural Experiment Station during the 50 years of existence. The scientifically trained workers have been closely associated with the industry throughout this long period and have given of their time, energy, and best thought to the solution of the many problems relating to the production of all types of horticultural crops.

During these 50 years there have been numerous changes in Florida's horticulture. Areas of production have shifted from one part of the State to another. In these changes new crops and new varieties have come into existence and many new problems have risen. The whole picture of the State showing the locations of the various types of horticultural crops produced is quite different now from what it was 50 years ago. During these 50 years the University of Florida Agricultural Experiment Station has been conducting investigations that would be of assistance to the horticultural industry of the State.

The efforts of the workers have been devoted to a study of the problems of production and handling of fruits, nuts, vegetables, and ornamentals. One phase of the work has been the collection and dissemination of proven methods of production and handling of these crops, while, on the other hand, there has been much work done on the developing of and the improving of old methods. These research problems have been quite varied and have dealt with many vexing questions which have continually arisen in the planting and growing of these horticultural crops in Florida.

Therefore, a great amount of data accumulated over the 50-year period since the Experiment Station was established has been assembled and published in various forms which are available to Florida growers. These have included popular and scientific articles, press bulletins, and Station bulletins and carry complete information on certain phases of work that have been completed under particular projects covering definite lines of research. While not all of these publications are now available for distribution there are files of these in the library of the Experiment Station and other principal libraries of the State and nation which can be referred to by any who are interested in looking up the research work that has been carried on.

Dr. E. W. Berger, entomologist with the State Plant Board, spraying entomogenous fungi onto a citrus tree to control injurious insects such as whitefly and scale. This process of natural control of harmful insects was developed by the Experiment Station. Cultures of fungi are now supplied each summer by the State Plant Board.

The research in horticulture as conducted by the Agricultural Experiment Station is distributed over the State so that plants growing on various soil types and climatic conditions can be worked with and problems peculiar to specific locations dealth with. There are two branch stations where problems of research are entirely horticultural. One is the Citrus Experiment Station located at Lake Alfred where all research in connection with citrus culture is conducted. This Station was established by the Florida Legislature in 1917 and work began October 1929, and since that time it has carried on investigations that have proven to be of great value to the citrus industry of the State. The other branch station is a Subtropical Experiment Station located at Homestead. It was established by the 1929 Legislature and work was started in January 1930. The problems with which it is concerned are in relation to the growth and production of vegetable crops of that area and the culture of sub-tropical fruits. This is the younger of the two horticultural stations but it has already established its worth in the results of the investigations which have been and are now being conducted. In the other branch stations horticultural work receives attention, also, for problems pertaining to those particular sections, soil types, and climatic conditons.

Horticultural scientists have been confronted with many and varied kinds of problems and their work has been carried out in such a way that the growers can try and put into practise the results of their investigations.

It has been impossible to work on all problems simultaneously, but those appearing to command immediate attention have been the ones included in the projects. There have been laid out and organized in such in such a way that the greatest amount of data could be obtained most efficiently and economically.

There have been a wide range of these projects since the Experiment Station was established 50 years ago in Lake City. They have dealt with nutritional and utilizational problems, all with the one aim to be of assistance to the producers of horticultural crops. Naturally, production has received a large amount of attention as methods of management

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GREAT WORK ACCOMPLISHED BY AGRICULTURAL EXPERIMENT STATIONS

The University of Florida Agricultural Experiment Station has done a great work for Florida horticultural interests, particularly the Florida citrus industry. It is fitting therefore that the fiftieth anniversary of the establishment of the Station should be appropriately celebrated by the industries which have benefitted by the experimental research conducted over this long period of years by the Station.

During the fifty years since the establishment of the Florida Agricultural Experiment Station, there have been numerous changes in Florida's horticulture. Areas of production have shifted from one part of the state to another, new crops and new varieties have come into existence and many problems have arisen. In the solution of these problems through scientific research, the Experiment Station has played an important part — a part which is, and should be, highly appreciated by the horticultural interests of the state.

Citrus growers are particularly interested in and have greatly benefitted by the work done at the branch station at Lake Alfred, where citrus experiments are carried on by a corps of able and conscientious workers who have solved many of the cultural problems of citrus growers. In the production of citrus fruits one of the great problems was the control of certain physiological conditions and deficiency disorders. In the solution of this problem, the Experiment Station has rendered an important service to growers.

Research work along other lines has been equally beneficial and no year of the past fifty has passed without some outstanding accomplishment to the credit of the Florida Agricultural Experiment Station.

The research workers at the Experiment Station and its branches and the officials of the University in charge of the work are entitled to the thanks of the horticultural interests of the state.

ORGANIZATION—OR DISORGANIZATION?

Russell Kay, who from long experience should know, and probably does know, a lot about the citrus situation in Florida, in an open letter to the press of the state views the situation from a new angle. Mr. Kay surmises that the industry has been so thoroughly organized that it is completely disorganized. Among other things he says:

"They tell us our great need is organization, but if you ask me, we've been over-organized for years. We've spent so much time organizing we ain't had time for anything else. We've had Growers Committees, Growers Leagues, Growers Exchanges, Growers Cooperatives, Growers Associations, Growers Commissions and Growers this and that, with dues and assessments, commissioners, directors, managers, coordinators and what-have-you, 'till any Florida citrus grower who hasn't belonged to at least a dozen such groups and helped to finance and promote a lot of others is mighty hard to find.

"When we add to the various Grower organizations the various Shipper and other allied groups, boy I mean we got as fine and complete an assortment of high class organization as can be found anywhere, and at the same time we find the industry as a whole about as beautifully disorganized as selfishness, greed, politics and personal interests can make it."

Every Florida citrus grower who has been in the business long enough to bring a citrus grove into even partial bearing must admit that there is more than a grain of truth in what Mr. Kay says.

What the citrus industry of Florida needs is fewer organizations and more real organization —an organization of growers united in the single purpose of bringing the industry back on a profitable basis for the producers of citrus fruits. That the nucleus of such an organization is being formed, some growers believe. That it may achieve the objects sought, every well-wisher of the industry hopes.

What the citrus industry of Florida needs is real organization — organization which will really organize, rather than dis-organize, the industry of the state. Let us hope that the achievement of this seemingly impossible task is on the way.

Maybe sometime, somewhere, somehow, some set of legislators will prescribe a test for citrus fruits which will prevent its shipment before it is fit to eat.

Whatever other conditions may be, it is the grower of quality fruit who receives the highest prices.

Time to be thinking about that fall fertilization.

A citrus tree must be fed and kept free of pests if it is to produce an abundance of quality fruit.

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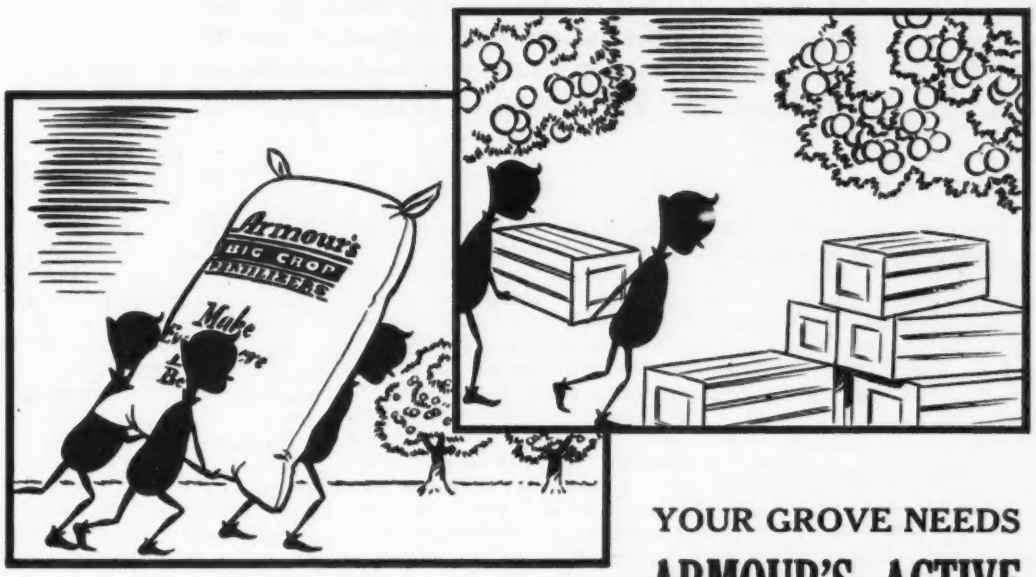

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Citrus Fruits - Diseases & Pests

Control Of Plant Bugs In Citrus Groves

A Warning Against The Approach Of The Larger Plant Bugs, And A Discussion Of Ways To Combat Their Attacks On Citrus Fruit, By Means Of Cover Crops, Written By Entomologist, Florida Agricultural Experiment Station

J. R. Watson

The time is approaching when our citrus growers should be on guard against some of the larger plant bugs which sometimes attack citrus and cause much damage. There are several species of these: 2 or 3 species of the brown stink bugs, the leaf-footed plant bugs, but most abundant and troublesome of all is the southern green stink bug, often called "pumpkin bug" by our growers. It is this bug we will have especially in mind during this article, but control measures will also apply to the other stink bugs. The pumpkin bugs have been less numerous than usual in the peninsular part of the state for the past two years but on the other hand are especially abundant in west Florida where our satsuma groves may have trouble. This scarcity in the southern part of the state has apparently been due to a high percentage of parasitization by the feather legged fly the previous year.

These insects breed in greatest abundance on legumes. Of the common legumes planted in citrus groves for a cover crop their first preference is cowpeas, followed by beggarweed, **Crotalaria striata,** velvet beans, and **Crotalaria spectabilis.** As long as there are plenty of these cover crops in the grove in good, succulent condition the bugs are not likely to go to the citrus. It is only when something happens to make the cover crop no longer attractive that they move on to the citrus fruit.

In the case of the crotalarias they do not care much for the leaves and stems. With these plants it is the young pods from which they suck the sap which attracts them and anything that takes the young pods off, such as a high wind, is liable to drive them to citrus. The bugs themselves, if they get sufficiently abundant, may take all the pods of **Crotalaria striata,** then they move on to the citrus. As these cover crops die down with the approach of the dry weather of the fall there is a continual migration to the citrus fruits, particularly if the latter are approaching maturity.

Because **Crotalaria striata** produces pods all summer and fall, it is liable to breed up numbers of the insects. **Crotalaria spectabilis,** i. e., the one with the big leaves, does not ordinarily produce many pods until fall. It is beginning to blossom and the great bulk of its blossoms will appear in early September. It will set an immense number of pods which will mature nearly at one time. This does not give the pumpkin bugs time to breed in large numbers on the **Crotalaria spectabilis.** The period when there are suitable young pods is too short. Because **striata** produces pods over a longer period it is much more likely to produce pumpkin bugs in large numbers. There is another factor to consider in the case of the crotalarias. If cowpeas are planted early they will largely die down before citrus fruit becomes attractive to the bugs, whereas the crotalarias having a longer growing season will remain attractive until frost, by which time at least the early varieties of citrus fruit are susceptible to attack by the bugs.

The most dangerous of all the cover crops is a mixture of several varieties, cowpeas, beggarweed and crotalarias, for instance. Pumpkin bugs will start in early in the season on the cowpeas. About this time of the year they will transfer their activities to beggarweed, and when this begins to die down in September they will go to the crotalarias, often in sufficiently large numbers to take the pods all off, in which case they will then migrate to the citrus.

The bugs prefer not only mature fruit but also those varieties with a thin rind. Satsumas are the first to be damaged in the fall. Tangerines, later on, are a great favorite, followed by Hamlin oranges, Parson Browns, pineapples, and and seedling oranges. Valencia oranges and grapefruit are not apt to suffer severely.

The fruit, if punctured often enough by these bugs, will drop from the trees. Even those that do not drop are liable to decay in transit, as the punctures of the bugs make convenient avenues of access for various fungus diseases, so that a punctured fruit is usually a total loss.

From now on until the fruit is picked, or the bugs are put into hibernation by cold weather, which usually will not occur until November, the cover crop should be watched, and if there are numerous plant bugs there it should be known inside of the next 2 or 3 weeks. The reason for mowing at this time is that the bugs belonging to the last generation in the fall are now mostly in their early or nymphal stages. They have no wings, therefore they cannot fly, so that if the cover crop is mown at this time the vast majority of them will perish, particularly if the fruit in the groves is not yet sufficiently mature to attract them.

It is not a bad idea to leave a little strip of cover crop in the middle between the rows, first cutting around the trees. If the bugs are abundant this cutting should be thorough. After the mowing machine has gotten all that it conveniently can a man with a scythe should follow to complete the work, mowing around the trees first. These bugs will then move on to the strip of cover crop left in the middle and be drawn away from the trees.

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A few days later this middle strip may also be mown. The bugs will be so far away from the trees that not many will reach them, particularly if there are no low limbs touching the ground.

We know of no spray which is effective in killing these bugs which will at the same time be safe to use on citrus fruit. Once allowed to get on the fruit in dangerous numbers the only control measures that we know of is to collect the bugs in nets. This is not an impossible task and can indeed be done for anywhere from two dollars to five dollars per acre. However, if the cover crop is given proper attention at this time this outlay can be avoided.

Many of these bugs are eaten by birds, among them the domestic fowls, including chickens, turkeys, and especially guineas. We have never seen a heavy infestation of these bugs in a grove where numbers of chickens wandered regularly. Chickens, however, usually do not wander far from the house and barn, therefore they give less protection to the more remote parts of a large grove. Guineas and particularly turkeys would be more effective under such conditions.

It does not necessarily follow that all cover crops should be mown at this time of the year. It often happens that even the favorite cover crops do not harbor many bugs. They have many enemies. Besides birds there are insect enemies which destroy a great many of them. But the time is upon us when growers should be on the lookout for these bugs and if found in any considerable numbers the cover crop in the grove should be mown inside the next two weeks. Mowing the cover crop at this time will also reduce the damage from two other pests which are often troublesome in the fall, i. e., grasshoppers and rabbits. Mowing the cover crop exposes these pests to their enemies, especially birds.

TEXAS CITRUS GROWERS TO VOTE ON MARKETING PLAN AMENDMENTS

The Agricultural Adjustment Administration has announced that a grower referendum will be held soon to determine whether growers favor the issuance of an order covering the proposed amendments to the marketing agreement regulating the handling of citrus fruit produced in three Texas counties—Cameron, Hidalgo, and Willacy. At the same time the marketing agreement, as amended, will be submitted to handlers for their signatures.

Among the proposed amendments to the program are: computation of new handler allotments on the basis of the quantity of fruit under control; interchange of interests and intrastate shipping allotments between handlers; weekly reports from shippers; and Federal-State inspection during periods when grade or size regulations are operative.

The amendments, which were proposed to improve administration and operations of the marketing agreement program which has been in effect since July 13, 1937, were tentatively approved recently by the Secretary of Agriculture. A hearing on the proposed amendments was held in June.

The order, requiring all shippers to comply with the program, may be issued in its amended form if two-thirds of the growers voting, by number or by volume, favor such action and if handlers of 50 per cent of the volume of citrus fruit shipped in interstate commerce from the specified counties, sign the amended agreement.

Under the agreement program provision is made for the regulation of shipments in interstate commerce by volume, grades and sizes.

The plan provides for coordination with a State marketing program. Amendments to the State program similar to those proposed for the AAA plan also were considered at a hearing in June.

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Citrus Grove Management

Fall Clean-Up Measures . . .

Against Whitefly And Scale In Citrus Groves — A Timely Article On The Best Methods Of Spraying Citrus Trees To Minimize The Damage Done By These Insect Pests— By Entomologist, Florida Agricultural Experiment Station

J. R. Watson

The time of year is here when growers should be thinking of the fall clean-up on their citrus trees which may be too heavily infested with scale insects and whiteflies. Although the cloudy-winged whitefly will be on the wing until November, the last brood of the common citrus whitefly, which is usually by all means the largest brood of the year, is now on the wing or has just disappeared in the southern part of the state.

They will soon have laid practically all their eggs and in ten days after the disappearance of the brood of adult whiteflies practically all of the eggs will have hatched. The larvae of the whiteflies are small and easily killed. There is, too, another reason for killing them in the early stages of their life history, that is to prevent the drain on the trees which accompanies the growth of the larvae. It is evident that the younger the whiteflies can be killed the less damage there will be to the trees, so that the program that the Experiment Station has long advocated is to watch the flight of the adult whiteflies. When these have largely disappeared from the wing, wait ten days for the eggs to hatch. The average period for an egg to hatch is seven days but by waiting ten days one assures himself that practically all of the eggs are hatched. At the end of this ten days period is a good time to spray. In other words, the last week or so in September or the early part of October is an especially good time to spray for the common citrus whitefly. This is the last brood of the season and if these larvae are killed the trees will remain free of whiteflies until the spring brood emerges, usually the last of February or March.

In groves where the cloudy-winged whitefly is abundant it would often be well perhaps to wait a month later as this species is later in coming out than what we have always called the common citrus whitefly. in some parts of the state. however, the cloudy-winged whitefly has during the last few years become the more abundant of the two.

The proper spray, of course, is an oil emulsion. There are many brands of these on the market, containing a variable amount of oil, but in all cases of the less highly refined oils the amount of oil in the dilute spray should be 1 per cent, but with the more highly refined oils 1½ per cent is recommended. This does not mean 1 per cent or 1½ per cent of the emulsion but 1 per cent of actual oil. Follow the directions on the containers for dilutions. This oil emulsion, if thoroughly applied, will at the same time clean up any infestations of scale insects on the trees.

There are other reasons why the early fall is an especially good time to clean up citrus insects. The rainy season will soon end which means that the entomogenous fungi, which do such good work in keeping down scale insects and whiteflys, will gradually become less efficient. Then too, the fall of the year is the more convenient time to spray. One cannot spray trees when they are wet with dew or rain and with the less highly refined oils at least it is usually not safe to spray when the temperature is above 90 degrees F. If you subtract from the average summer day those hours when the trees are wet with dew or rain and those hours when the temperature is above 90, not a very long day is left for spraying. Later on in the season the citrus grower will be busy with picking and marketing activities and it is well to get this spraying out of the way before the busy season begins.

However, there is one exception to the statement that this is a good time to apply an oil emulsion spray. The exception is early ripening fruit. An oil emulsion spray may delay the ripening of the fruit for a time and interfere with coloring. In the case of early varieties which it is desirable to market as early as possible, Hamlins, satsumas, early varieties of grapefruit, etc., this delay in maturity may be very undesirable. It is therefore recommended that early maturing varieties should not be sprayed with an oil emulsion until after the fruit has been picked.

The spraying, of course, should be thoroughly done. In the case of whiteflys, particular attention must be given to the underside of the leaves, as this is where the larvae are found exclusively. The purple scale is liable to occur on both surfaces of the leaves as well as the twigs and fruit. The Florida red scale is usually on the upper side of the leaves and fruit. Therefore, to give a good kill of all of these pests a thorough coverage is necessary. An oil emulsion will also kill any rust mites hit but not will not give as long a protection against rust mites as will lime-sulfur, or any other compounds containing sulfur.

If the infestation of whiteflys and scale insects is not particularly severe, or there are many rust mites present, or especially with the early varieties mentioned above lime-sulfur fortified with 5 to 10 pounds of wettable sulfur per 100 gallons may be substituted for the oil emulsion and give satisfactory control. This will not delay the coloring of the fruit as does an oil emulsion, but, if anything, has the opposite effect, hastening coloring and imparting a finer texture to the rind. It will also give longer control of rust mites.

Oil emulsion should not be applied within two weeks of an application of lime-sulfur as the combination of oil and sulfur on the leaves is liable to cause serious burning. For these reasons then, late September and early October is an excellent time to give a clean up spray for whiteflys and scale insects. The rainy season is drawing to a close, making spraying more practicable. The weather is cooler and there is less danger of burning the fruit. Entomogenous fungi cannot be depended upon to control whiteflys and scale insects during the dry part of the year. It is well to get this work out of the way before the picking season begins, or the time for disking groves.

Citrus Fruits, marketing

Marketing And Production

A Paper Presented At Last Meeting of Florida State Horticultural Society Outlining Views Of One Of State's Outstanding Growers and Shippers, and Former Citrus Commission Chairman.

L. P. Kirkland

The production of citrus fruits in Forida, Texas, Arizona and California is increasing very rapidly. In all probability the crop for 1938-39 will be much larger than the crop for the season now closing. You all know what the results have been in Florida this season.

Is the present system of marketing bringing satisfactory results for the grower? I believe that the answer would be unanimously: No! The lack of team work in the industry has been very expensive. The growing of citrus fruits is of too much importance to the state and nation for any of us to give up the fight to put this industry on a profitable basis.

You may now ask what is necessary to correct some of the practices that are hurting the industry. First, there are 331 packing units in the state with a capacity for packing 1476 cars of grapefruit per day or 995 cars of oranges per day and this does not allow for any over-time. This means that approximately 8400 cars per week can be packed for shipment. We have packing facilities sufficient for putting on the market a crop of thirty-six million boxes in approximately seventy-five working days and no one working over-time to do it. There are approximately 250 sales units. The burden of trying to carry all of these packing, shipping and sales units is greater than the grower can live under. In my opinion in the absence of control of the movement of fruit there will never be another profitable year for the citrus growers of this state.

Now for the production: A few days ago right here in Winter Haven I was discussing production and quality with a grower who has two or three hundred acres of grove and he passed off the question of quality fruit with the remark that he sold his fruit on the tree and that the shippers who bought fruit demanded nothing in the way of quality, but wanted to buy at the lowest possible price. I know with prices as they now are there is every temptation to grow fruit as cheaply as possible and in too many cases

(Continued on Page 18)

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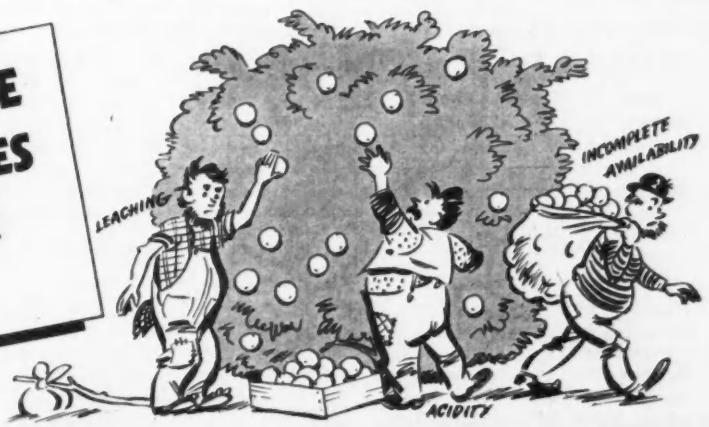

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A REVIEW OF THE FLORIDA CITRUS SEASON

(Continued from page 3)

hand, there had been 944,852 field boxes of oranges sent to Florida canneries through May 14, or 72 per cent above the total amount canned in 1936-37. Present indications are, however, that the total quantity of Florida citrus fruit used for canning purposes will be less this season than for the record season of 1936-37.

The combined effect of the heavy supply of citrus and the decreased purchasing power of consumers during the 1937-38 season is revealed in the price obtained for same. If the ten citrus auction markets are taken as a guide, the following price summary for 1937-38 through May 20 may be compared directly with the previous season.

Florida orange auction prices up to the Christmas Holidays in 1937 were quite similar to the 1936 prices for the same period. In 1936, however, there was a substantial price improvement after the Christmas Holidays, due to adverse weather conditions in California which greatly reduced supplies from that source and to the steady improvement in business conditions at that time resulting in improved consumer purchasing power. The orange price continued to increase, reaching a peak of $4.00 per box for the week ending March 26, from which point there was a gradual decrease until the end of the season. The situation during the present season was exactly the opposite from 1936-37. The orange crop estimate was increasing in all areas, but consumer purchasing power was decreasing. Therefore, the Florida orange price followed a downward trend until the last of April. There was some improvement during the first two weeks in May, but the average auction price per box for the week ending May 20 was only $2.57 compared with $3.48 at the same time in 1937 (Figure 1).

Figure 1 — Weekly average auction prices Florida oranges ten auction markets (Standard Boxes)

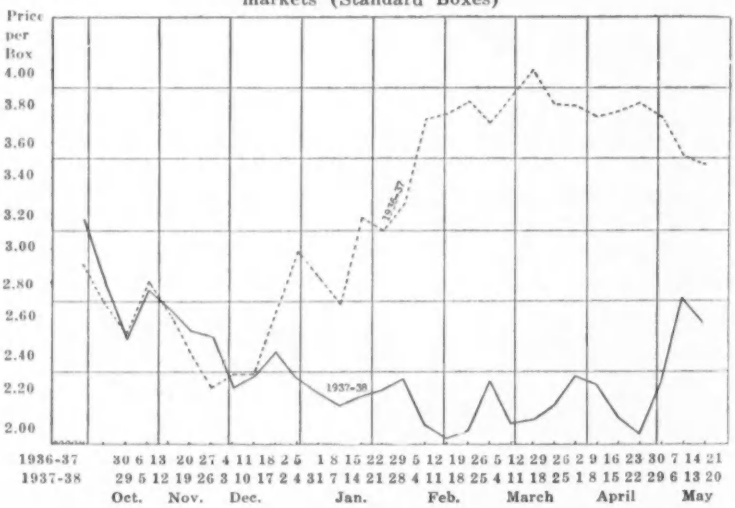


Table 1. — Comparison of May 11, 1938, Estimate of Production of Oranges. Grapefruit and Tangerines for the 1937-38 Season with the Record of Production in 1936-37.
Total Production — Packed Box Basis

All states	This season	Last season	% change from last season
Oranges	68,370,000	52,174,000	31.0 increase
Grapefruit	28,944,000	30,680,000	5.7 decrease
Tangerines	2,250,000	3,000,000	25.0 decrease
Total	99,564,000	85,854,000	16.0 increase

Table 2. — Comparison of Citrus Carlot Movement This Season Through May 18 with a Year ago at the Same Date. (Includes Rail, Boat and Motor Trucks reports reduced to carlot basis).

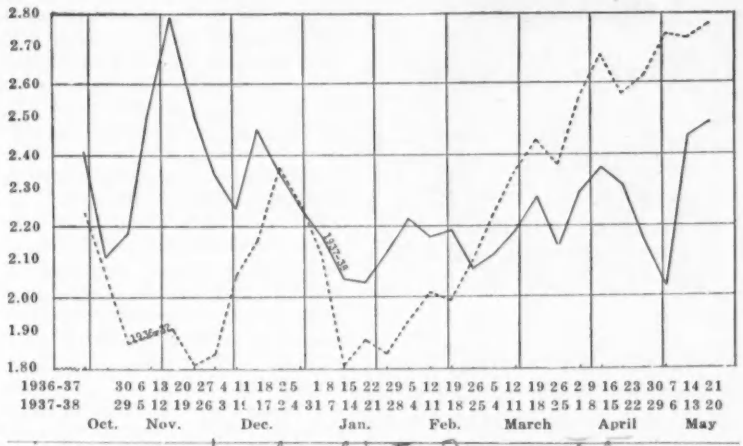
	Carlots this season	Carlots last season	% change from last season
		Florida	
Oranges	45,648	35,727	27.8 increase
Grapefruit	15,782	23,137	31.8 decrease
Tangerines	4,036	5,619	28.2 decrease
Mixed citrus	8,740	8,479	3.1 increase
Total	74,206	72,962	1.7 increase
		Texas	
Oranges	2,800.6	4,092	31.6 decrease
Grapefruit	15,105.9	16,489	8.4 decrease
Tangerines	1	0	100.0 increase
Mixed citrus	1,016	1,874	45.8 decrease
Total	18,023.5	22,455	15.7 decrease
		California	
Oranges	33,674	23,334	44.3 increase
Grapefruit	903	451	100.2 increase
Tangerines	5	7	28.6 decrease
Mixed citrus	954	770	23.9 increase
Total	35,536	24,562	44.7 increase
		All States	
Oranges	82,487.6	63,452	30.0 increase
Grapefruit	33,681.9	41,036	17.9 decrease
Tangerines	4,053	5,626	28.0 decrease
Mixed citrus	10,796	11,277	4.3 decrease
Total	131,018.5	121,391	7.9 increase

Auction prices for Florida grapefruit ruled appreciably higher during the present season than in 1936-37 through the first week in March. This was due primarily to the reduced supply for the current season. Since that date, the improvement in the grapefruit price this season has been very slow and irregular as compared with the 1936-37 season, and for the week ending May 20 the average auction price per standard box of Florida grapefruit was $2.49 compared with $2.77 at the same time a year ago (Figure 2).

In summary, the outstanding features of the 1937-38 citrus season have been the record crop of oranges from all areas, a grapefruit crop in all areas only 5 per cent below the the record crop of the preceding season, and a consumer market with a rapidly decreasing purchasing power throughout the season.

An additional chart relating to the Review of the Florida Citrus Season will be found on page 17.

Figure 2 — Weekly average auction prices of Florida Grapefruit ten auction Markets (Standard Boxes)



1. citrus fruits; Transportation

Outmoded Terminal Markets Costly To Railroads And Public

2. Railroads

The Bureau of Agricultural Economics said recently that one of the major reasons for the decline in rail tonnage of fresh fruits and vegetables in recent years is the failure of the railroads to cooperate with each other and with other agencies in working out efficient methods of handling produce in the large city markets.

Figures were cited showing that rail shipments of fresh fruits and vegetables have declined by approximately 200,000 carloads during the last 7 years — from 1,000,000 carloads in 1931 to 800,000 in 1937.

Total production of fresh fruits and vegetables during this period increased about 15 per cent.

"If the railroads had merely held their own relative to other methods of transportation," the Bureau said, "they would have hauled 1,150,000 carloads in 1937 instead of only 800,000. Thus in 1937 the railroads were 350,000 carloads short of holding the relative position which they had in 1931."

Reasons for the loss of this business by the railroads to the motor trucks are discussed by William C. Crow in the September issue of the Bureau's monthly publication "The Agricultural Situation." An important one, often overlooked, he says, is the "wholesale markets to which those products move are often located off the railroad." He cites a recent study by the Bureau of Agricultural Economics showing that in 35 out of 40 large cities some hauling from railroads to the principal wholesale market is necessary.

Conditions in Philadelphia are cited as "typical." In Philadelphia, the principal market is located some distance from the railroad facilities. Shippers find it easier, less costly, and more efficient to transport produce by motor truck. The result, Crow says, is that the railroads in recent years have lost the business of hauling about 10,000 carloads a year to Philadelphia, chiefly from New York, Virginia, the Carolinas, Georgia, and Florida.

"Railroads have given lip service to their desire to retain the fruit and vegetable business, and have actively opposed competing methods of transportation," it is stated in the article. "But railroads often have often overlooked opportunities for constructive action, and have sometimes taken action detrimental to their own cause."

It is alleged that in some cities the railroads have not only manifested no interest in providing rail connections with wholesalers' stores or warehouses; they have "actively objected to such rail connections with markets. In several cities, it is charged, the railroads "have built 'markets' and barred all produce except that arriving over their own lines," thus preventing their structure from becoming a real market. In a number of cities, "competing produce terminals built by railroads have resulted in wastes of millions of dollars through needless duplication of investment, and often actually made the marketing system worse than it was before."

Crow says that "constructive action demands that the railroads cooperate not only with each other but with other agencies so that complete wholesale markets may be located where deliveries by rail can be made directly into the market buildings, as motor trucks now do."

He concludes with the statements that under the present set-up, the cartage and handling charges on produce arriving by rail in the wholesale markets of some cities are twice the charges on truck receipts, that so long as wholesale markets are located off the railroads transportation by rail will be at a disadvantage.

FLORIDA LEADS SOUTHEASTERN STATES IN CO-OPERATIVES

Marketing, cooperative

Over 100,000 farmers in North Carolina, South Carolina, Georgia and Florida are members of farmers' cooperative marketing and purchasing associations with an annual volume of business of over $72,000,000, according to figures released today by the Columbia Bank for Cooperatives from the recently completed nationwide survey of farmers' marketing and purchasing assotions, conducted by the Farm Credit Administration.

Florida leads all four states in the number of these cooperatives and in volume of business but is smallest in membership. The 130 associations in that state have a membership of approximately 7,677 and their annual volume of business is over $43,000,000.

North Carolina comes second in number of cooperatives and mem-

(Continued on page 21)

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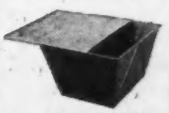
For 25 years National-Riverside Heaters have saved millions of dollars to citrus, deciduous and truck growers. Low in Cost and High in Efficiency ... Write to



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MARKETING AND PRODUCTION

(Continued from Page 15)

with no regard for quality. I have eaten fruit from many groves in the last few years that the program of fertilization particularly has been such that the flavor and texture of fruit has been completely destroyed. I am convinced under present conditions that quality fruit should be the motto of every grower, and unless it is the final results are going to be disastrous. In my opinion if we in Florida will grow the quality fruit that we can grow and set up the proper control of shipments we can get a fair profit from our investment in groves.

It has been demonstrated by both Texas and California, who have control organizations, that you certainly get a higher return for your fruit. The records show that in the first five weeks Texas was under proration they moved to market 3235 cars of grapefruit and the price per box advanced from $1.83 to $2.28, a gain of 45c per box, and that for the same period Florida with no control shipped 2692 cars, or 543 cars less than Texas and we had a decline in price from $1.85 per box to $1.81, or a decline of 4c per box. You all know that California oranges for weeks sold from 75c to $1.00 a box more than our oranges and you can give control of shipments full credit for this difference.

Are we going to use the brains and intelligence God has given us to better these conditions, or will we continue to be selfish and wreck this industry? If every grower and shipper will get behind a real progressive merchandising and advertising program, and a constructive marketing agreement and not let politics interfere with it (though there is grave danger of that happening), and ship nothing but the very best fruit, with all of us working to better the industry as a whole instead of our own individual positions in the industry, we will see the industry move forward very rapidly. With Texas, Arizona and California working under control and Florida with no control of any kind we are definitely headed for ruin and disaster, unless we put our house in order.

CONTROLLING ROOT-KNOT IN SEED BEDS

(Continued from Page 7)

must be thoroughly washed before one attempts to eat. There is not much danger from the gas in the open air. However, it is best for one to work with his back to windward. For instance, if the wind is from the south begin the application on the north side of the seed bed and gradually back up to the south. By this means there will be no danger to the workmen as the wind will blow the fumes away from him. Incidently, this gas will kill insects in the soil—cutworms, white grubs, mole crickets, ants and other pests.

Cyanide is fairly efficient in eliminating root-knot from the soil and is very much cheaper. It is applied at the rate of 1000 pounds to the acre and must be very thoroughly mixed with the soil. It has practically no powers of penetration. A good way to apply it is to scatter about half this amount on the top of the soil, then disc it thoroughly and plow it deeply; then apply the other half to the top of the plowed soil and disc it thoroughly again, after which apply a little irrigation water if the soil is dry. It is also an excellent plan to let a man or boy follow the plow and put a little cyanimid in the bottom of each furrow, particularly if the furrow is shallow. Cyanimid is also an excellent fertilizer.

This method is not as thorough, however, as the use of hydrocyanic gas, and one must wait a month after its application before it is safe to plant the more delicate seeds, such as celery and lettuce. This method is being used to a considerable extent on the acreage basis in Florida.

Another good material to control root-knot in the soil is formaldehyde in solution. Though this has no fertilizing value it also eliminates such fungus diseases as damp-off and makes a most excellent treatment where both nematodes and certain fungus diseases are to be controlled.

You Cannot Make Money

Growing citrus fruit if your production cost is as great or greater than the price you receive for your fruit when you sell it.

The Only Solution

Lies in reducing your production costs to the point where you still have a margin of profit when you sell.

It Can Be Done

Operating under the plan we recommend your production costs can be reduced and at the same time the quantity and quality of your fruit brought up to the very maximum.

Simple But Accurate

Our method involves a thorough and technical analysis of your soil and recommendations as to the ingredients needed to bring your grove up to maximum production, with the elimination of all unnecessary expense.

We invite the most thorough investigation

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Frostproof, Fla. — Weslaco, Tex.

W. G. MEAL APPOINTED HEAD FRUIT, VEGETABLE DIVISION

(Continued from Page 3)

year.

Also under Mr. Meal's direction will rest the administration of the Produce Agency Act of 1927, The Standard Container Act of 1928, the Perishable Agricultural Commodities Act of 1930, and the Export Apple and Pear Act of 1933. On June 30 of this year approximately 19,800 commission merchants, dealers and brokers who handle fresh fruits and vegetables in interstate or foreign commerce were licensed under the Perishable Agricultural Commodities Act.

There is no place in a democracy for either communism or fascism.

THE SATSUMA SITUATION

Loxely, Ala., Aug. 12, 1938

Return of the citrus prosperity, the best kind this section has known since it turned from saw milling to agriculture. is heralded by the promise of a large crop of satsuma oranges, with which the trees along the Gulf Coast are weighted to the breaking point.

With nearly two months to go before the satsuma harvest begins, many orchards in Alabama, Mississippi and west Florida are so loaded with fruit that the limbs of the trees have to be proped to keep them off the ground and the crop is said to be three times as great as that of 1937.

"Conditions of orchards and fruit have not been so good as this season since 1929," said Dr. Winberg of Silverhill, Horticulturist, who predicts that fruit growers will make money this year and the public will find this a good source for its citrus fruit before the new California and Florida crops come on the market.

In a new orchard midway between Loxley and Silverhill, in Baldwin county, Alabama, Dr. Winberg has a planting of 4,000 trees composed of thirty different varieties, which he is testing for such qualities as resistance to cold, shipping qualities and flavor of such qualities as well as quick development of trees and early ripening of their fruit. Dr. Winberg says that within five years he will have something definite and positive to tell the public about those best adapted to this region.

So far, the best varieties for this section he has found, he says, are the Owari, Silverhill, and Hozoki. which have stood cold, born large crops for early marketing and otherwise stood a high test, but he is reserving his opinion as to what variety is best until further tests shall have been concluded.

C. D. Kime
Consulting Horticulturist

Grove Advisory Service, Soil Investigations Research

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Tampa and Port Everglades, Florida

FIFTY YEARS OF HORTICULTURAL RESEARCH

(Continued from page 8)

in the growing of the crops are of the utmost importance. The kind, amount, and application of fertilizers seem quite simple just in the statement that a certain program should be followed. But back of such recommendations are many years of research conducted by the Experiment Station on its properties and in cooperation with growers in strategical locations. It is necessary to know if such a program will economically increase production and will the resulting yield be of high quality and supply a product that will command a profitible price when marketed.

In the field of horticulture, from Pensacola to Key West, the Experiment Station is continually answering questions asked about many and varied problems in relation to the growing of the various crops adapted to the different sections from those which will stand the cold in north and west Florida to the tender plants which can only be grown in the tropical parts of south Florida. Varied as the industry is over this vast expanse of territory the horticulturist must keep everlastingly at his job and be ready to initiate studies whenever necessary.

Horticultural workers in the Experiment Station were among the first in the country to diagnose the trace element deficiencies in plants and to develop methods of control. Years of research have been required to obtain these results and to work out methods of application which are now commonly practiced in many sections of the State. The research conducted in this field with horticultural crops has been second to none in any institution.

In the production of citrus fruits one of the great problems was the control of certain physiological conditions which were found to be deficiency disorders. An outstanding example of this was the condition in citrus known as frenching which was a wide-spread and troublesome deficiency disease. This was found to be a deficiency which could be corrected with zinc sprays and in working out this problem the growers have readily included zinc in their sprays at the proper time and in so doing they have improved the conditions of the trees to such an extent that it has been easier to maintain normal growth.

Consequently, now to a large extent the use of zinc in citrus sprays is a standard practice and it has been extremely beneficial in the management of the groves and has saved the growers a considerable amount of money in maintaining normal fruit production. Other deficiencies which have received considerable attention by horticultural workers have been those occuring with a lack of copper manganese and magnesium. Quite notable results have been obtained at the Citrus Experiment Station in these and other closely related problems as they apply to the citrus industry.

Horticultural workers have found that there are many other crops which manifest deficiency symptoms at various times under certain conditions. Bronzing is quite a troublesome condition in tung tress and this can be corrected by the use of zinc applied to the soil. It also responds to zinc sprays as well as to soil applications. Rosette in pecans is another disorder which responds to zinc treatments either as soil applications or foliage sprays. All of these findings in relation to the uses of zinc have been found to be applicable to the practices which are put into effect by the growers of these various crops and now zinc is used quite extensively in the treatment of the soil where the deficiencies show up. Another deficiency which has showed up in tung trees and certain ornamentals is a chlorosis which has been corrected by the applications of manganese to the soil or as a foliage spray.

With all of the work that has been done in the quantity production of high quality products, the fact has not been overlooked that there must be proper methods of handling and preparation for the farmer to obtain the highest returns on his investment. In some instances the method of handling, packing, transportation, and storing will determine whether or not a profit will be realized. Again it may be possible to more profitably market the crops in some manner other than the usual custom, or they may be utilized in the manufacture of some product that will enjoy ready acceptance by the consuming public. Consequently members of the horticultural staff have given attention to these problems and have conducted research that has yielded data which is of considerable importance.

GROWERS SPRAYING CITRUS TREES FOR CONTROL OF APHIDS — Polk County, Florida. Control of insects and diseases on citrus trees and fruits has been one of the principal research problems of the Experiment Station's entomologists and plant pathologists. Their recommendations have enabled growers to fight these pests more successfully.

In the field of frozen fruits and fruit juices there have been some important developments that are adaptable to commercial applications. Information is available as to the fruits which are suitable for this purpose that will retain their form, texture, and quality during the process of quick freezing. This together with other lines of work with the utilization of fruits and juices in the manufacture of various food products are of considerable importance to the industry because of the fact that now attention is being directed toward the development of new agricultural products.

The handling and storing of vegetables carry many problems that confront the workers in this field. Storage conditions and temperatures are important and the stage of maturity at which the vegetables should be stored are all important problems which are receiving the attention of men in horticultural research.

There has been a great amount of work done on the maturity of fruits, especially avocados and citrus. The results of the avocado studies were published several years ago in an

Experiment Station bulletin that gives all of the data obtained in this line of work. Citrus fruits have been studied for several years and a vast amount of information tabulated on their condition during the various stages of development from bloom to maturity. Also the different parts of the same fruit have been studied analytically and these correlated with the findings in other fruits produced on the same tree as well as those born on other trees growing under similar conditions and treatments together with those produced under different environmental factors.

An important phase of citrus research has been that of refrigeration. Experimental work that has been conducted in this field has shown that it is possible to hold fruit in common refrigeration for short periods if properly handled. Another important finding that has been developed in this field of research has been methods for still air storage in the refrigeration of citrus fruits. This method that has been developed at the Experiment Station permits the holding of fruit in cold storage from two to five months in areas where such long storage of fruit may be profitable. Wrappers for citrus fruits have been experimented with also and various types were found to have significantly different effects on the keeping quality of the individual fruits. These findings in connection with the use of cold storage and wrappers are available in Agricultural Experiment Station bulletins.

Investigations have shown that several products can be manufactured out of pecan nuts. Pecan oil, cake, meal, and butter are some that have been developed in the laboratories of the Experiment Station. While none of these are being manufactured commercially at the present time, they are products of high quality that can be made if and when there is a demand for them.

Horticultural investigations have brought out the economical and beneficial uses of fertilizers and cover crops in relation to growth and production of trees and plants. Leguminous cover crops for both winter and summer have received considerable attention and their use has increased the yields of many crops that are produced in Florida.

The Experiment Station horticulturists have ever been alert to the needs of the industry and have always strived to work for its development and improvement along all lines. Many varieties of numerous species have been introduced by various individuals and organizations and it has been incumbent upon the Experiment Station to test these on its own farms or through observation as to the success with which they grow and produce on the different soils and under the various climatic conditions existing in Florida. Thousands of plants have been tested to determine their worth to the State's horticulture. These have come from all parts of the world, and while many are never successful some have proven to be worth while and have added to the value of the industry.

The Experiment Station has been able to do a line of work in the development and the testing of varieties and strains that could not have been carried out if it had not been in existence. In this phase of investigations it has been possible to test fruits, nuts, vegetables, and ornamentals, and thus obtain a vast amount of information about the varieties of these crops that is of inestimable value to the industry.

The tung oil industry which is becoming one of commercial importance in the State is just one example of the new crops which have been introduced through the Experiment Station. Much attention has been given to this industry and a large percentage of the present commercial plantings of tung oil trees in Florida and other states are directly or indirectly traceable to the initial planting made by the Florida Agricultural Experimental Station and the work done by the men in charge of these.

When pecan investigations were first started by the Florida Experiment Station about 1900 there were very few budded or grafted orchards in the commercial belt. The information gained in the investigation carried out by the Florida Agricultural Experiment Station has been largely responsible for the development of the pecan industry here in north and west Florida as well as in the adjoining states. The pecan industry now has changed from that of largely seedling production to one in which a great majority of the nuts are of named varieties and the management of the orchards and production of nuts of this type have been studied closely and extensively by the Experiment Station workers.

The marglobe tomato resistant to nailhead rust and other diseases was introduced to Florida growers at a time when nailhead rust threatened to destroy the tomato industry. It has stood the test over a period of years and continues to be an important commercial variety in the State.

The Florida Station has worked in close cooperation with the United States Department of Agriculture in the testing of newly introduced plants and varieties which it has developed. In addition to the tung tree there have been many fruits, nuts, vegetables and ornamentals received and tested during this first half century.

Problems in connection with the growth and production of horticultural crops generally require years of study and experimentation in order to arrive at their solutions. Some have presented what seemed to be an impregnable front but many of these have had their secrets revealed and remedial measures developed through persistent, consistent, and constant research. However, there are numerous problems awaiting solution and new ones arise that challenge the wit and ingenuity of all horticultural workers in the Agricultural Experiment Station. In all these investigations the interest of the industry in the future, as it has been during the past 50 years) will continue to be uppermost in the minds of those conducting horticultural research.

FLORIDA LEADS SOUTHEASTERN STATES IN COOPERATIVES

(Continued from page 17)

bership but third in volume of business. South Carolina is fourth in number of cooperatives, number of members and in volume of business.

The survey revealed that North Carolina has 115 cooperatives, with a membership of 42,555 and their annual volume of business approximates $9,100,000. Georgia has 60 cooperatives with a membership of 39,869 and their annual volume of business is approximately $13,426,000. South Carolina has 17 cooperatives with a membership of 13,335 and their annual volume of business is approximately $6,474,000.

In the United States, according to figures from the survey, there are 10,752 cooperatives and in 1936 their volume of business aggregated approximately $3,000,000,000.

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PLANT BOARD OFFICIALS ATTENDED HEARING ON WHITE-FRINGED BEETLE

Chairman R. P. Terry of the State Plant Board, Dr. Wilmon Newell, plant commissioner, and Dr. J. H. Montgomery, quarantine inspector, attended the hearing in New Orleans September 15 at which the United States Department of Agriculture considered the imposition of a federal quarantine against the white-fringed beetle. The State Plant Board officials appeared in the interests of Florida growers and producers.

The white-fringed beetle, an extremely destructive pest, was discovered in Florida in the spring of 1936. It is now known to be present in Okaloosa and Walton counties, and near Pensacola in this state, as well as in southern Alabama, Mississippi, and Louisiana. State quarantines have been operating since its early discovery, and now the United States Department of Agriculture is considering placing an embargo in an effort to prevent spread of the pest.

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ALYCE CLOVER SEED. Ripe and cleaned. Ideal cover and hay crop. Write for information. P. E. Synder, Box 866, Lakeland, Fla.

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Fifty Years Of Entomology Research

By J. R. WATSON
Entomologist, Florida Experiment Station

One of the fields in which the Florida Agricultural Experiment Station has been a leader has been in the control of insects by encouraging or importing their natural enemies. More than any other station on earth, this station has made use particularly of the entomogenous fungi. There are many of these. On citrus whiteflies there are chiefly four; the red aschersonia, the yellow aschersonia, the brown fungus and the cinnamon fungus. On the purple scale there is the red-headed scale fungus, the white-headed scale fungus, the black scale fungus, and on the Florida red scale particularly the pink fungus.

The original work on these fungi was done by P. H. Rolfs and Faucet and Dr. E. W. Berger developed particularly the means of spreading these fungi in the field.

Other fungi attack mealy bugs and rust mites, to mention only those attacking insect pests of citrus.

Following the lead of the California Experiment Station in the introduction of the Australian ladybeetle to combat cottony cushion scale, Florida from the very first has been able to hold down the cottony cushion scale very well by having on hand and spreading a supply of the Australian ladybeetles. This work, like that of the entomogenous fungi, although carried on by the Experiment Station, is now in the hands of the State Plant Board.

The Experiment Station imported from California also the Cryptolaemus ladybeetle to help control mealy bugs. However, as in California, this ladybeetle is ordinarily unable to survive the winter. To make use of it, it is necessary to liberate them each spring.

A more striking success has been the introduction and establishment of the Chinese ladybeetle, Leis, as a predator on the green citrus aphids and other aphids. We believe this is the first case where an imported aphid-feeding ladybeetle has become permanently established in a region outside its native habitat. This ladybeetle, first introduced into Florida in 1924, has now become thoroughly established in three counties.

Other parasites are those of the cane borer, introduced in cooperation

J. R. WATSON
Studying Insects Through The Microscope

wi h the Bureau of Entomology of the U. S. Department of Agriculture.

More recent work on citrus insects has largely had to do with the combination sprays for whiteflies, scale insects and fungus diseases. This work has been actively carried on at the Citrus Sub-station.

An interesting study was the working out of the life history and spread of the velvet bean caterpillar, a severe pest not only of velvet beans but of gudzu, peanuts, and soy beans, as well as its native host plant, the sword bean. This caterpillar is indeed one of the chief drawbacks on the raising of soy beans in Florida. Except possibly in the extreme southern end of the state, it was discovered that this caterpillar never overwinters in Florida. It is killed out not by the direct cold but by the destruction of its food plants and its inability to hibernate. This inability to hibernate is probably due to its tropical origin, where it has never been under the necessity of developing the hibernating habit.

An animal pest, though not an insect, has demanded much of the attention of this department in the last two decades; namely, the root-knot nematode. This station was the first to demonstrate that by growing on the land a plant absolutely immune to this worm and keeping out all other vegetation that the worms could be exterminated in a single summer, thus freeing the land for truck crops during the succeeding

(Continued on Page 23)

Fifty Years Of Constructive Service Is A Noteworthy Achievement . . .

We congratulate The Florida Agricultural Experiment Station upon its completion of a half century of effective work in behalf of agriculture in the State.

The unselfish and unbiased studies and experiments conducted by this organization have proven most helpful to everyone connected with agriculture in Florida. Its findings have advanced the solution of many of the problems which confront the citrus growers of the State and its studies have aided much in the production of greater quantity and finest quality at lower cost.

The staff of the Citrus Experiment Station at Lake Alfred is deserving of the utmost commendation for its very practical study of growing problems and its ever ready cooperation with all individuals and organizations in the industry who seek its assistance.

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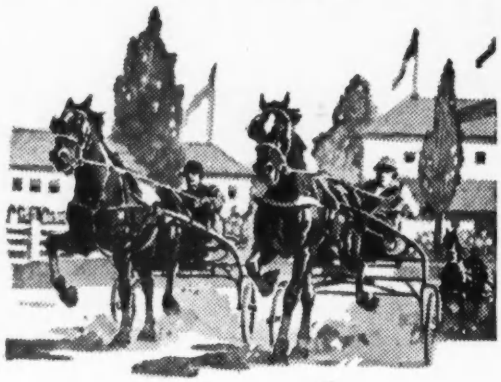

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